and changes which are unceasing; it always contains certain substances in what is called "unstable equilibrium," which become decomposed and reduced to more stable compounds the moment the peculiar vital property is lost. An organised being is not produced by the direct union of definite proportions of two or more simple substances; it arises by the growth of a germ, a portion separated from the body of a pre-existing organised being of the same kind. Finally, organised beings never assume accurate geometrical forms, but under the influence of life each kind of organised being assumes a characteristic, though not absolutely definite shape, which is the resultant of the sum of the shapes of all its structural elements, which has a very close relation to the shape of the organised being from which it was derived as a germ, though it is not identical with it, and which is called its individual form.

I have thus far contrasted inert matter with organised beings possessing life. That the term life indicates a very special property there can be no doubt, but, as yet, an impenetrable veil seems to shroud its ultimate processes. I believe, however, that the veil is at the far end of the labyrinth in which we are now wandering, and that patient observation and guarded generalisation may yet enable us greatly to narrow the limits of the unknown—to approach some steps nearer to the veil. I must premise that, as I am now looking at the subject from a purely physiological point of view, I regard life simply as a condition capable of producing certain perceptible phenomena, and can take no cognizance whatever of that mysterious union between spirit and matter which is broken in passing through "the valley of the shadow of death." Material processes and material changes only are subject to the material instruments of biological research. Those inner mysteries are now and must probably ever remain—in our present condition of existence—beyond the veil.

It becomes daily more manifest with the advance of knowledge that the action of known physical laws—such as chemical affinity and capillarity as manifested by porous media and by colloids—are most intimately interwoven with all organic processes, and it is, as yet, impossible to say how far life may influence, in the sense of modifying or directing, the action of these laws. Life has been called the vital force, and it has been suggested that it may be found to belong to the same category as the convertible forces heat and light. Life seems, however, to be more a property of matter in a certain state of combination than a force. It does no work in the ordinary sense. If a man lift a weight a couple of feet off the ground, many of the so-called vital actions are called into play, but yet every part of the work done can be accounted for by the action of the ordinary physical forces. The act of the will, in regal phrase the "mere motion," which induced the lifting of the weight, can be referred, we can scarcely doubt, to the mechanical action of some part of a large and complicated apparatus, the cerebral hemispheres, and was accompanied by a waste of its substance.

The telegraphic communication to the muscles involved which harmonised their several acts and signalled the contraction of their fibres, was conveyed through a cord whose molecules were set in vibration by a force very probably convertible with the physical forces, generated by chemical change and the waste of tissue; and in the muscle, the organ by which the weight was actually raised, an amount of waste took place—that is to say, an amount of carbon was combined with oxygen precisely equivalent theoretically to the quantity of coal which must have been burned in a perfectly constructed engine to do the same work.

Chemical forces act in living beings under very special circumstances. For a series of years a mass of substances are held undergoing constant change and throughout in the most unstable state of chemical combination. The instant the condition of life is removed, decomposition commences, and the complex constituents of the body are resolved into more simple and stable combinations. But yet it may be fairly questioned whether the chemical relations of the component elements of an organised body are in any way directly affected or controlled by life. It has become quite conceivable, especially through the researches of the late Master of the Mint, that a constant adjustment and re-adjustment of membranous and colloid diaphragms in the presence of powerful catalytic agents may possibly explain the maintenance of almost any chemical conditions however complicated.

The one function of living beings whose explanation it seems at present impossible to imagine except by regarding it as the manifestation of a special property, is what has been called the "moulding of specific form;" the building up of a heterogeneous and complicated organism, which shall repeat, not rigidly but with a certain flexibility, the characters which have been transmitted to it through a germ from a parent, every molecule of every part having thus a direct relation in form, in position, and in composition, to every other molecule of the body. At present, regarding it from a purely material point of view, we are scarcely justified in regarding life as more than that condition of an organised being in which the products of chemical and physical changes taking place within it are stamped with a specific organic form.

(*To be continued.*)

SCIENTIFIC SERIALS

Journal of the Ethnological Society of London (January 1871). A paper by Mr. E. B. Tylor on "The Philosophy of Religion among the lower Races of Mankind" gives in a condensed form his views on the development of "Animism," *i.e.* the doctrine of the soul, and of spirit and deity in general, a subject which is treated at length in his recently published work on "Primitive Culture."—Prof. Huxley's address on the "Geographical Distribution of the Chief Modifications of Mankind" is accompanied by an ethnological map, which curators and lecturers will do well to adopt as a wall-map. The principal races of mankind are defined as the Australioid, Negroid, Mongoloid, and the Xanthochroic and Melanochroic (fair and dark whites.) Among the special features in Prof. Huxley's scheme of the races of mankind, the following are prominent. The indigenous non-Aryan tribes of Central and Southern India, and less closely the ancient Egyptians and their descendants, the modern Fellahs, are referred to the Australioid type. The Negroid type of Africa is divided between the Negroes proper and the Bushmen of the extreme south, the Hottentots being considered a cross-breed between these two races. The Mongoloid type is made to include not only the brachycephalic Tatar races, but classification by skulls is set aside, and the group is arranged to include the Chinese and Japanese. The "absurd denomination" of "Caucasian" is abandoned, and the nations thus described by ethnologists come under the titles of Xanthochroi, fair whites, who are classed as of special type, and Melanochroi, dark whites, which latter Prof. Huxley is disposed to consider as sprung from intermixture of Xanthochroi and Australioids. In this classification of human types or races, Prof. Huxley rests on physical characteristics, treating language as subordinate. In his remarks on "The Ethnology of Britain" he again states his views as to the great division of European men between the fair whites of the centre and west, and the dark whites of the south. Both types occur in the early population of our islands, the use of Celtic language not corresponding with a racial distinction.—Dr. Nicholas's paper on the "Influence of the Norman Conquest on the Ethnology of Britain" is in strong antagonism to the view that Englishmen are ethnologically "Low Dutch." In his view, the old British race, in great measure, kept its early type, the Saxon, Danish, and Norman invasions affecting language, government, &c., rather than replacing the population itself.—Among the papers on Prehistoric Archæology are Sir John Lubbock's description of the Park Cwm Tumulus, and an account of remains of "Platycnemic Men in Denbighshire," by Mr. W. Boyd Dawkins and Prof. Busk.—Canon Greenwell's paper on "The Opening of Grime's Graves in Norfolk," gives full particulars as to the site of a Stone Age manufactory of implements from the excellent flint of the district. The chalk was systematically mined for the flint, and the so-called "Grime's Graves" are ancient pit-workings of this class. Colonel Lane Fox is disposed to explain in the same way the "Danes' Holes" in Kent, long a puzzle to antiquaries.—Looking at the number of the journal of the Ethnological Society, it is to be hoped that the journal of the new Anthropological Institute will maintain its very high standard of succinctness, solidity, and general interest.

THE *Geological Magazine* for the present month (No. 83) contains only four original articles, of which the first is an account by the editor, Mr. H. Woodward, of the objects which more particularly attracted his attention during a recent visit to the Brussels Museum. He notices especially the fossils of the Antwerp crag, and a fine example of the mammoth found at Lierre, in the province of Antwerp, in a sufficiently perfect state to be mounted as a skeleton. Two figures of this interesting specimen are given. Mr. Woodward also refers to

© 1871 Nature Publishing Group

a fine series of skulls of *Ursus spelæus* from the Belgian caves contained in the Museum at Brussels.—Mr. Whitaker describes the chalk of the cliffs from Seaford to Eastbourne in Sussex, which he illustrates by a section, and compares with that of the Kentish cliffs.—In a paper (illustrated with a map) on the Denudation of the Coalbrook Dale coal-field, Mr. Daniel Jones endeavours to explain the puzzling arrangement of the coal measures in that locality by demonstrating that the southern portion of it has been largely denuded, and subsequently overlain by coal measures of younger age, so that the deposits are not uniform and persistent.—Mr. W. Davies gives us an alphabetical catalogue of type specimens of fossil fishes in the British Museum, in continuation of the similar lists already published by Sir Philip Egerton and Lord Enniskillen of the type specimens in their collections.—The remainder of this number is occupied as usual by notices, reviews, reports and correspondence.

THE *Proceedings of the Royal Irish Academy*, Series II. No. 2 of vol. i. has just been presented to the members. This Part contains Mr. Andrews's notice of the capture of *Ziphius Sowerbi*. The President's Annual Address. W. Archer "On some new or little-known Freshwater Rhizopods (Plates 12 and 13). Mr. R. C. Tichborne, Laboratory notes. G. J. Stoney "On the Cause of the Interrupted Spectra of Gases." Prof. R. Ball "On the Motion of Vortex Rings in Air." C. E. Burton "On Results obtained by the *Agosta* Expedition to observe the Recent Solar Eclipse." Principal Dawson, Note on *Eozöon Canadense*. Prof. T. S. Hunt, Notes on Messrs. King and Rowney on *Eozöon Canadense*. Prof. Macalister, "On Human Muscular Anomalies." The Appendix contains the minutes of the Proceedings of the Academy, and the Correspondence relative to the Bombardment of Paris.

IN the *Journal of Botany* for May, Mr. C. E. Broome describes a new British fungus *Scleroderma Geaster*, with a lithograph. The contributions to local botany are a continuation of Mr. More's Supplement to the "Flora Vectensis," and Notes of plants of the neighbourhood of Oxford, by Prof. Thistleton-Dyer. We have also a further instalment of Dr. Hance's "Sertulum Chinense," and the usual short notes, reports, reviews, and proceedings of societies.

SOCIETIES AND ACADEMIES

LONDON

Zoological Society, May 16.—Prof. Flower in the chair.—The Secretary read a report on the additions that had been made to the society's menagerie during the month of April 1871; and called particular attention to a female of the lately-described Prince Alfred's deer (*Cervus alfredi*), which had been received in exchange, and was stated to have been originally brought from the Philippines.—An extract was read from a letter addressed to the secretary by Dr. R. A. Philippi, Director of the National Museum at Santiago, stating that no species of the tortoise was known to occur in Chili, and that the specimens upon which the so-called *Testudo chilensis* had been based had been received from Mendoza, in the Argentine Republic.—Prof. T. H. Huxley communicated a paper by Dr. P. Martin-Duncan, F.R.S, containing descriptions of the Madreporaria (stony corals) dredged up during the expedition of H.M.S. *Porcupine* in 1869-1870.—Sir Victor Brooke, Bart., F.Z.S., read a paper on Speke's Antelope (*Tragelaphus spekii*) and the allied species of the genus *Tragelaphus*, in which the distinguishing characters of these animals were pointed out, and their synonymy and distribution given.—Mr. P. L. Sclater communicated some notes on a collection of birds made in the vicinity of Lima, Peru, by Prof. W. Nation, of that place, with notes on their habits by the collector.—A second communication from Mr. Sclater contained a continuation of his notes on rare or little-known animals now or lately living in the society's gardens. Mr. Sclater also gave the description of a new parrot, now living in the society's gardens, which he proposed to call *Lorius tibialis*.—Mr. R. B. Sharpe read a note on *Macheirhamphus anderssoni*, a very rare Accipitrine bird from Damara Land, and gave a history of the two species of *Macheirhamphus* now known to science.—Mr. J. Gould exhibited and pointed out the characters of a new humming bird, lately discovered by Mr. H. Whitely in Peru, which he proposed to call *Helianthea osculans*; and likewise characterised five other new species of the same family of birds.

Geological Society, May 10.—Prof. Morris, vice-president, in the chair. Dr. Henry Nyst, of Brussels, was elected a foreign member, and Prof. G. Dewalque, of Liège, a foreign correspondent of the Society. The following communications were read:—1. On the Ancient Rocks of the St. David's Promontory, South Wales, and their Fossil contents, by Prof. R. Harkness, F.R.S., and Mr. Henry Hicks. In the Promontory of St. David's the rocks upon which the conglomerates and purple and greenish sandstone, forming the series usually called the "Longmynd" and "Harlech Groups," repose, are highly quartziferous, and in many spots so nearly resemble syenite that it is at first difficult to make out their true nature. The apparent crystals are, however, for the most part angular fragments of quartz, not possessing the true crystalline form of the mineral. The matrix does not exhibit a crystalline arrangement, and contains a very large proportion of silica, much exceeding that which is obtained from rocks of a syenitic nature. These quartziferous rocks form an E.N.E and W.S.W. course. The arrangement of these rocks, which seem to be quartziferous breccias, is somewhat indistinct. In the immediate neighbourhood of St. David's they have associated with them irregular bands of hard, greenish, ashy-looking shales, much altered in character, but often presenting distinct traces of foliation. In a ridge running from the S.E. of Ramsey Sound in a north-easterly direction, the greenish shales are more compact, and resemble earthy greenstones. The quartziferous breccias and their associated shales form two anticlinal axes, contiguous to each other, and have on their S.S.E. and N.N.W. sides purple and green rocks. The order of the rocks from the quartziferous breccias upwards, when not disturbed by faults, is as follows:—

Lower Cambrian.

	feet.
1. Greenish hornstones on the S.E., and earthy Greenstones on the N.W., forming the outermost portions of the so-called Syenitic and Greenstone ridges.	
2. Conglomerates composed chiefly of well-rounded masses of quartz imbedded in a purple matrix . .	60
3. Greenish flaggy sandstones	460
4. Red flaggy or shaly beds, affording the earliest traces of organic remains in the St. David's Promontory, namely, *Lingulella ferruginea* and *Leperditia cambrensis*	50
5. Purple (sometimes greenish) sandstones . . .	1000
6. Yellowish-grey sandstones, shales, and flags containing the genera *Plutonia*, *Conocoryphe*, *Microdiscus*, *Agnostus*, *Theca*, *Protospongia*	150
7. Grey, purple, and red flaggy sandstones, containing, with some of the above-mentioned genera, the genus *Paradoxides*	1500
8. Grey flaggy beds	150
9. The true beds of the "Menevian Group," richly fossiliferous, and the probable equivalents of the lowest portions of the Primordial Zone of M. Barrande .	550

The discovery of a fauna specially rich in trilobites, among these rocks of the St. David's Promontory, affords very important information concerning the earlier forms of life of the British Isles. Until the discovery of this fauna, these rocks and their equivalents in North Wales were looked upon as all but barren of fossils. We have now, scattered through about 3000 feet of purple and green strata, a well-marked series of fossils, such as have nowhere else been obtained in the British Isles. In the Longmynds of Shropshire the only evidence of the existence of life during the period of their deposition is in the form of worm-burrows, and in the somewhat indistinct impressions, which Mr. Salter regards as trilobitic, and to which he has given the name of *Palæopyge Ramsayi*. If we assume the purple and green shales and sandstones, with their associated quartz rocks of Bray Head and the drab shales of Carrick M'Reily, county Wicklow, to represent the old rocks of St. David's, they afford only very meagre evidence of the occurrence of life during the period of their deposition in the form of worm-burrows and tracks, and in the very indeterminate fossils which have been referred to the genus *Oldhamia*. One very prominent feature about the palæontology of the ancient rocks of St. David's is the occurrence of four distinct species of the genus *Paradoxides*; and this is in strong contrast with the entire absence of the genus *Olenus*. On a comparison of the palæontology of the St. David's rocks with those of the continent of Europe and of America, which seem to occupy nearly the same horizon, we have like features to a very great extent presenting themselves. With reference to

© 1871 Nature Publishing Group